Cascadia Law Group
ENVIRONMENTAL ATTORNEYS

MEMORANDUM

TO: Brook Beeler, Ecology Eastern Regional Director
FROM: Cascadia Law Group and Yale Carbon Containment Lab
DATE: March 4, 2022
RE: Pilot Project for Sequestering CO_2 in the Columbia River Basalt Group – Regulatory Issues

The Yale Carbon Containment Lab (YCCL) has developed a proposal to permanently sequester carbon dioxide (CO_2) deep in the Columbia River Basalt Group (CRBG), a series of basalt formations mostly in Washington (WA) and Oregon, as part of its Carbon TrapRock Project. YCCL has conducted over a year of scoping and analysis, and its next operational phases involve drilling several characterization wells to better assess underground geologic formations in the CRBG and subsequently injecting supercritical CO_2 into a series of pilot test wells to determine the CRBG's potential for large-scale sequestration. This memo describes these two phases (collectively, "Pilot Project") and provides a preliminary assessment of likely regulatory issues.

I. DESCRIPTION OF THE PILOT PROJECT

The CRBG is an igneous province with an average vertical thickness of 1 km. YCCL proposes to inject supercritical CO_2 into the CRBG, where the CO_2 will react with the magnesium, calcium, and iron in the basalt to form carbonate minerals within the basalt's pore space, permanently storing the CO_2. A previous small-scale pilot test near Wallula, WA, conducted by the Pacific Northwest National Laboratory (PNNL), determined that rapid carbon mineralization will occur. Of the 977 metric tons (MT) of supercritical CO_2 that PNNL injected, 60% was mineralized within two years. YCCL anticipates its Pilot Project will validate PNNL's work. YCCL estimates the CRBG has a potential useable storage capacity of billions of MT CO_2.

YCCL is evaluating several potential sites. Initially, characterization wells will be drilled to better understand the specific geologic characteristics of the site(s). If the results confirm the presence of formations suitable for injection, pilot test injection well(s) will be drilled to a depth of 800 to 1500 meters to ensure sufficiently high pressure and temperature to use supercritical CO_2 and ensure mineralization. YCCL plans to install one to four pilot test injection wells (depending on the funds available) and to inject 10,000–50,000 MT supercritical CO_2 per well annually for 1 to 2 years. CO_2 injection will be limited to formations with favorable storage characteristics, including being bounded by both stratigraphic and structural trapping elements to confine CO_2 movement to a defined area, as well as formations that are deeper than any freshwater aquifers and separated from such aquifers by confining strata. The pilot test injection wells will be located at least 1 km from fault lines, dikes, and other potential areas of geologic complexity—yet near accessible regions where sources of CO_2 could be gathered. The results will be carefully monitored, and the data generated will enable YCCL to refine its estimate of the CRBG's maximum useable storage capacity and to calculate rates of CO_2 injection and mineralization across the CRBG. The Pilot Project will also more broadly confirm the CRBG's suitability for carbon storage and will inform siting decisions for larger-scale sequestration operations.

II. REGULATORY ISSUES

Our preliminary analysis indicates implementing the Pilot Project will require compliance with the following federal and state laws. YCCL intends to work closely with the Department of Ecology and the U.S. Environmental Protection Agency (EPA) to ensure regulatory compliance.

Safe Drinking Water Act (SDWA): YCCL believes, and the EPA has entertained the idea, that classifying the pilot test well(s) as Class V experimental wells rather than as Class VI wells may be appropriate. "Experimental" wells utilize a technology that "has not been proven feasible under the conditions in which it is being tested." 40 C.F.R. § 146.3. The purpose of the pilot test injection well(s) is to determine the suitability of the CRBG for larger-scale sequestration of CO_2 injected in its supercritical form; these wells would not be used for commercial geologic sequestration, which is what Class VI well permits cover. *See* 40 C.F.R. § 144.6(f); 75 Fed. Reg. 77291 (Dec. 10, 2010).

WA has primacy for Class V wells, which it defines to include "wells used to inject [CO_2] for geologic sequestration." *See* WAC 173-218-040(5)(a)(xv). Class V wells used for the geologic sequestration of CO_2 are not rule authorized and must obtain a state waste discharge permit. *See* WAC 173-218-115(1)(a). Ecology will authorize pilot test wells even when some regulatory criteria have not been met so long as the pilot will collect "site-specific information to establish the feasibility of permanent sequestration[.]" *See id.* at 4(b). As mentioned, the purpose of the pilot test injection well(s) is to collect data regarding the suitability of the CRBG for larger-scale sequestration, and, as such, the well(s) is/are appropriately treated as Class V wells.

The Class V rules state that "the total quantity of CO_2 to be injected" should not exceed "1,000 [MT] CO_2, unless the operator demonstrates … that a larger quantity is necessary to determine the feasibility and risks of a project." WAC 173-218-115(4)(b). This is a critical regulatory issue, as YCCL needs to inject more than 1,000 MT supercritical CO_2 to understand the CRBG's geologic characteristics and mineralization rates and extent, particularly its capacity to sequester CO_2 at a scale helpful to redress the climate emergency. We would like to confirm that exceeding the 1,000 MT CO_2 threshold will be acceptable.

National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA): YCCL will comply with NEPA and SEPA to the extent either or both apply. NEPA might be inapplicable. If the review and issuance of a permit under the SDWA is functionally equivalent to NEPA review, the latter will likely not be required. *See* 75 Fed. Reg. 77229 (Dec. 10, 2010). Similarly, if the Department of Energy provides any funding for the Pilot Project, that action is categorically exempt from NEPA so long as less than 500,000 tons of CO_2 in the aggregate is injected. *See* 10 C.F.R. § 1021.410(b). However, a NEPA analysis could be required for other reasons, such as if the pilot test injection well(s) is/are located on federal lands. YCCL will work closely with the EPA and other federal agencies to ensure NEPA compliance, and we look forward to working with Ecology to identify an efficient and timely approach to completing an adequate environmental review under SEPA. We currently believe a determination of non-significance (DNS) or a mitigated DNS will be appropriate for the pilot test injection well(s).

Tribal Consultation: YCCL introduced the Carbon TrapRock Project concept to members of the Yakama Nation in June 2021 and will work closely with it and other interested Tribes to identify and mitigate any potential impacts to tribal treaty rights, including potential impacts to cultural resources.

National Historic Preservation Act (NHPA): The NHPA requires any agency aiding or approving a project to comply with Section 106 of the NHPA by considering the effects of the proposed project on historic properties or archeological or cultural resources. We will contact the Department of Archeology and Historic Preservation and appropriate Tribes after preparing a list of potential injection sites.

Clean Air Act (CAA): Research and development projects "that will enable safe and effective long-term containment of a CO_2 stream in subsurface geologic formations, including research and short duration CO_2 injection tests conducted as a precursor to long-term storage," are exempt from the CCA's reporting requirements if an application is submitted within 180 days of receipt of a UIC permit. 40 C.F.R. § 98.449.

Clean Water Act (CWA): If installation or operation of the pilot test injection well(s) triggers the need for a discharge permit under either the Clean Water Act or Ch. 90.48 RCW, such permit will be obtained.

Water Rights: YCCL does not plan to beneficially use any water from the pilot test injection well(s). As such, we do not believe a water right permit will be needed. However, it may be necessary to pump water from the characterization well(s) to implement the preliminary characterization testing. We will work closely with Ecology to manage any such water in a manner that complies with applicable regulatory requirements.

Endangered Species Act (ESA): After YCCL develops its list of potential sites, it will determine whether any adverse impacts to a listed species or critical habitat could occur and, if needed, will apply for coverage.

We look forward to collaborating with Ecology to realize Washington's future as a leader in CO_2 capture and sequestration.